Build a TurtleBot Robotic Arm

(Trossen Robotics version)

Written By: Andrew Alter

TOOLS:

- 1.5mm Hex Wrench (1)
- 1/16 Hex Wrench (1)
- 2.5mm Hex Wrench (1)
- 5/64 Hex Wrench (1)
- Scissors (to cut foam) (1)
- Small Phillips Head Screw Driver (1)

PARTS:

- See Step 1 (1)

SUMMARY

The kit can be purchased here: https://www.trossenrobotics.com/p/Turtle...

It is a ready-to-build kit based upon the original TurtleBot Robot Arm found here: Build an Arm for Your TurtleBot

This build guide assumes that you know how AX-12 brackets are mounted to AX-12 servos. You must seat M2 nuts into the rows of sockets prior to bolting them down. Please refer to this video for instruction:

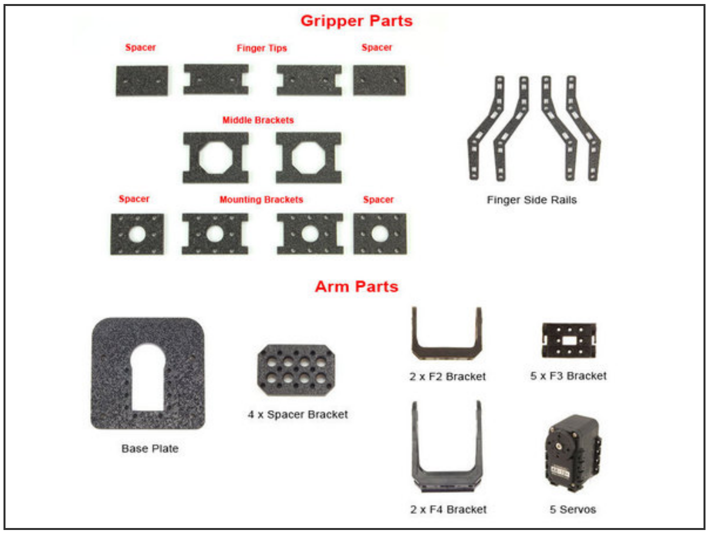
http://www.youtube.com/watch?v=o0JtXuj7H...

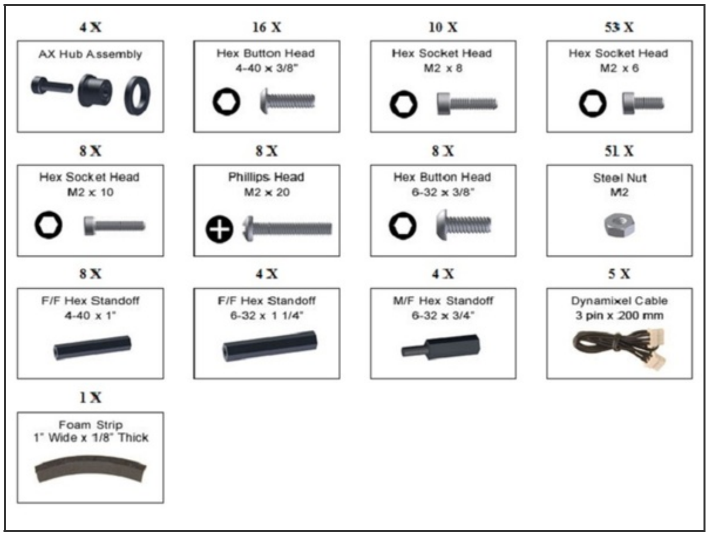
We also recommend the use of Loc-tite or a similar threadlocker:

http://www.youtube.com/watch?v=ISpqtMfSG...

Please note that the AX-12A servos that come with this kit have pre-assigned IDs.

Step 1 — Build a TurtleBot Robotic Arm (Trossen Robotics version)

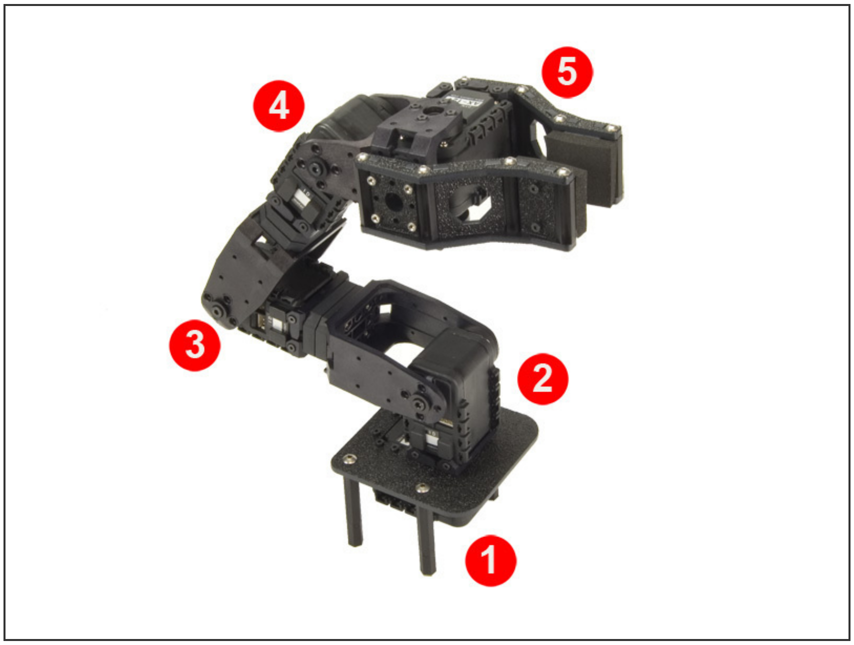




4 X AX Hub Assembly	16 X Hex Button Head 4-40 x 3/8"	10 X Hex Socket Head M2 x 8	53 X Hex Socket Head M2 x 6
8 X Hex Socket Head M2 x 10	8 X Phillips Head M2 x 20	8 X Hex Button Head 6-32 x 3/8"	51 X Steel Nut M2
8 X F/F Hex Standoff 4-40 x 1"	4 X F/F Hex Standoff 6-32 x 1 1/4"	4 X M/F Hex Standoff 6-32 x 3/4"	5 X Dynamixel Cable 3 pin x 200 mm
1 X Foam Strip 1" Wide x 1/8" Thick			

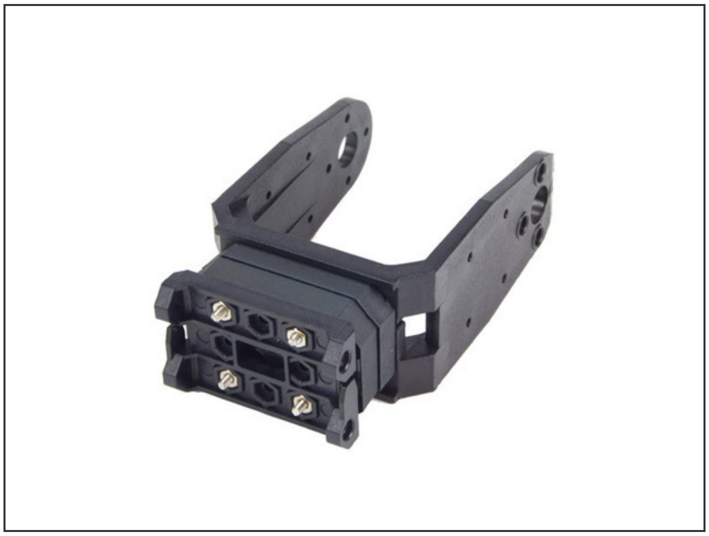
- Parts List Note: Some of the parts in some assemblies come packaged in seperate smaller bags because they come with a bracket or other various part. Please review the entire parts list to ensure you have all necessary components. Some kits will have spare bolts, nuts, or screws included.

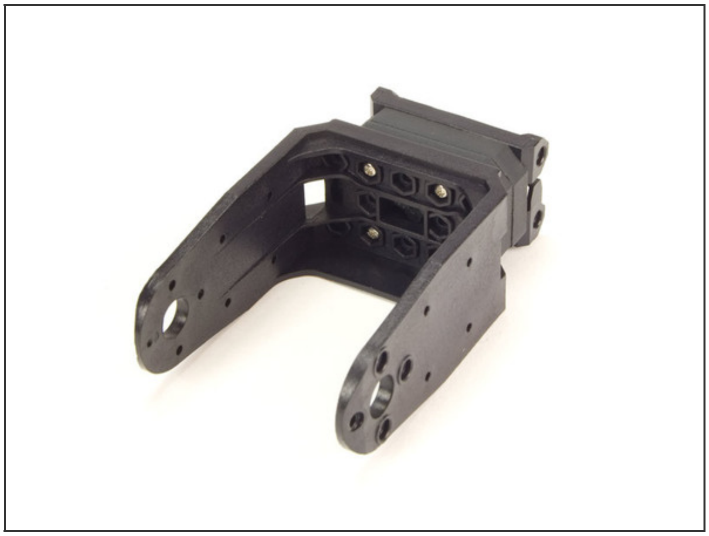
Step 2



- Make note of the servo IDs and their positions. Each servo has a # written on the back of it. Be sure you assemble the servos in the correct order so that your arm will work!

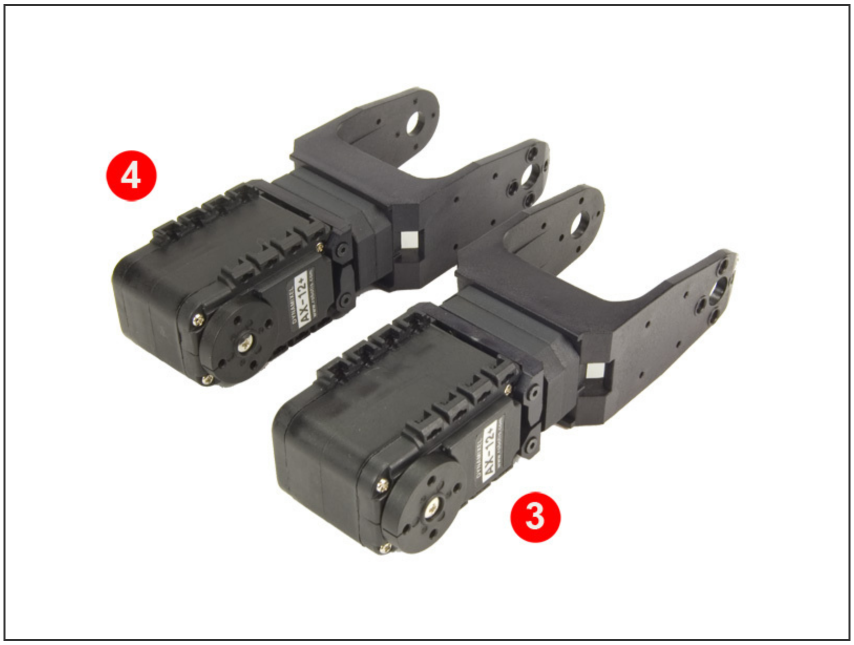
Step 3





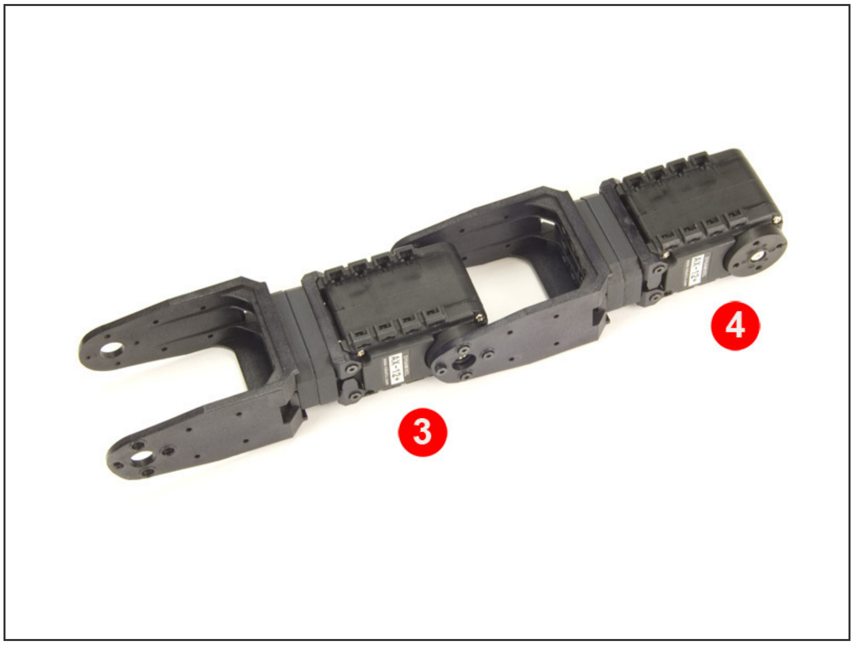
- Build TWO bracket assemblies by mounting the F4 bracket to the F3 bracket as shown with two spacer brackets inbetween.
  - 8x M2 Steel Nut
  - 8x M2 x 20mm Phillips Head Bolt

Step 4



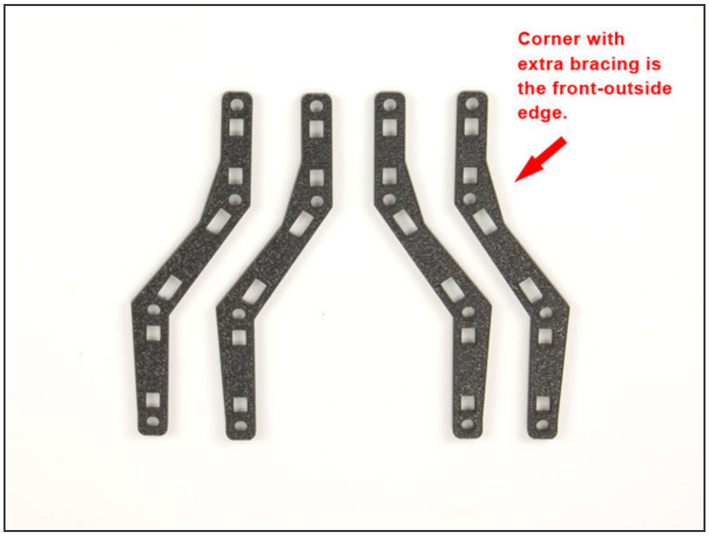
- Next, attach the bracket assemblies to servos #3 and #4.
  - 8x M2 Steel Nut
  - 8x M2 x 6mm Socket Head Bolt

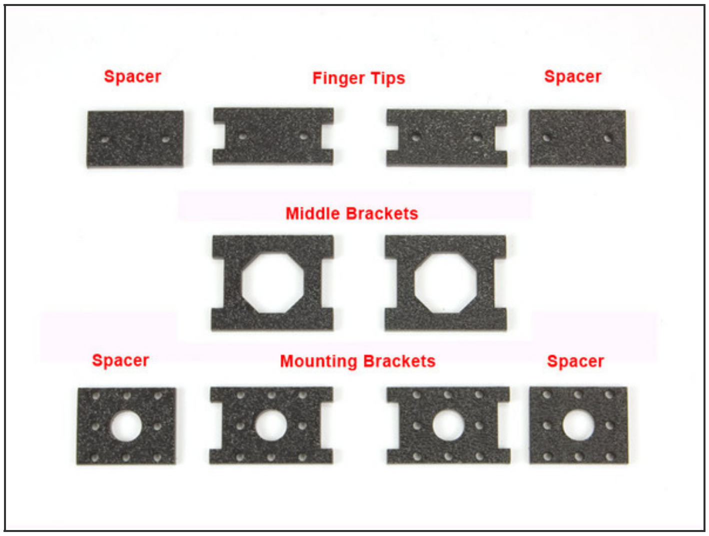
Step 5



- Bolt the assemblies together by connecing the #3 servo horn to the other F4 bracket.
  - 1x AX Hub Assembly
  - 4x M2 x 6mm Socket Head Bolt

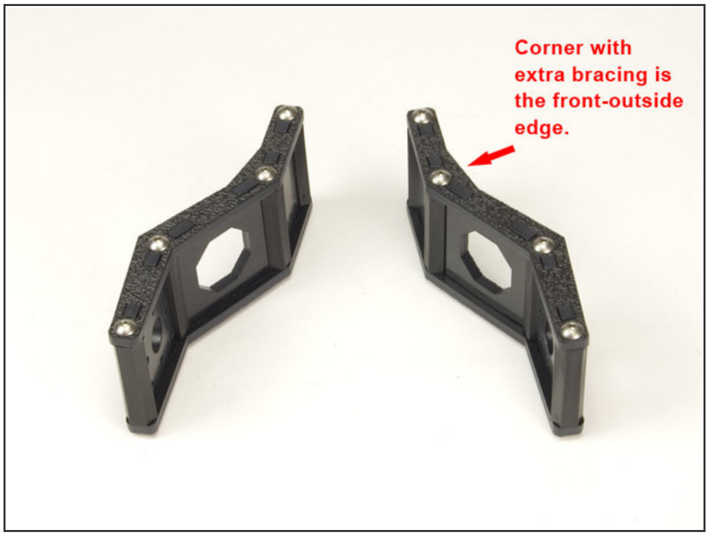
Step 6

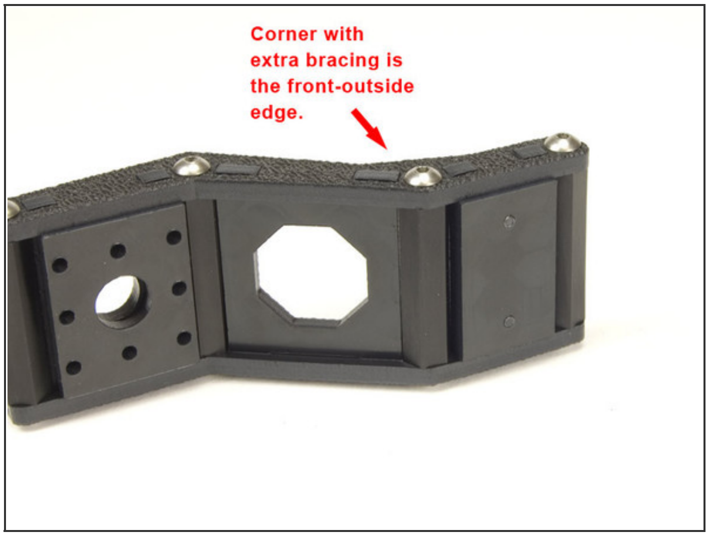




- Note the orientation of the gripper finger side rails. The inside corner on one side has extra bracing. This is the front-outside end of the fingers. Make sure these sides are paired up properly during assembly steps.
- It helps to layout the parts as shown so that everything makes sense. You will build the Gripper Fingers by first using the 6 parts in the two center rows.

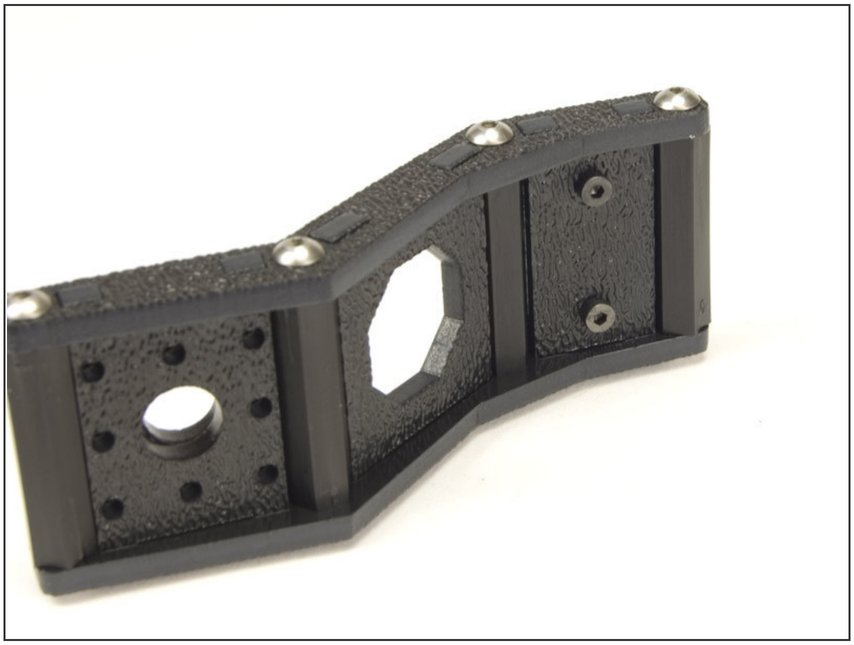
Step 7





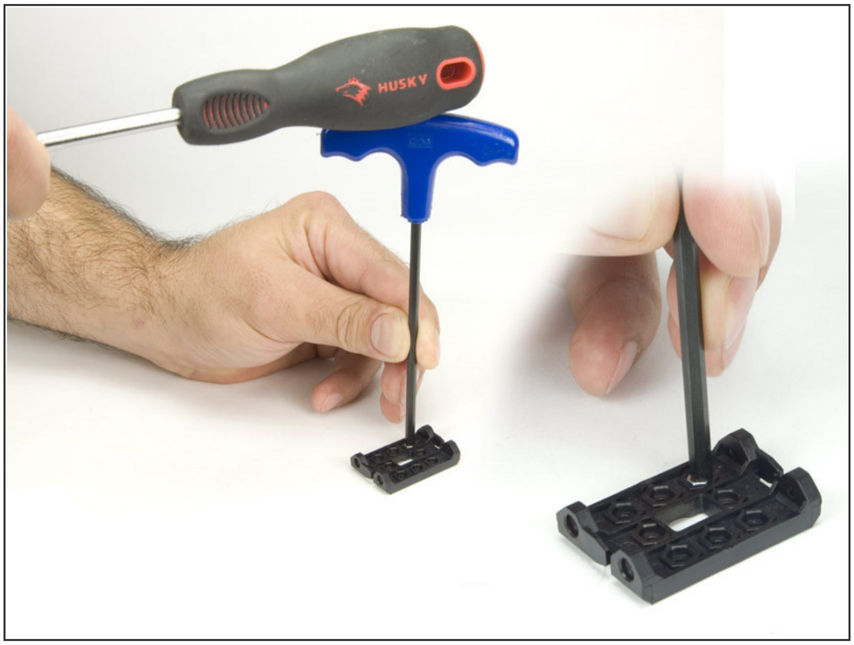
- Assemble the Gripper Fingers as shown. You want the textured side of the Side Rails facing out on both the top and bottom. The textured side of the center pieces should face out. Tighten the bolts nice and snug, but don't strip the standoffs.
  - 8x F/F 4-40 x 1" Hex Standoff
  - 16x 4-40 x 3/8" Button Head Bolt
- Place the spacers on the inside of each Finger as shown with the smooth sides exposed.

Step 8



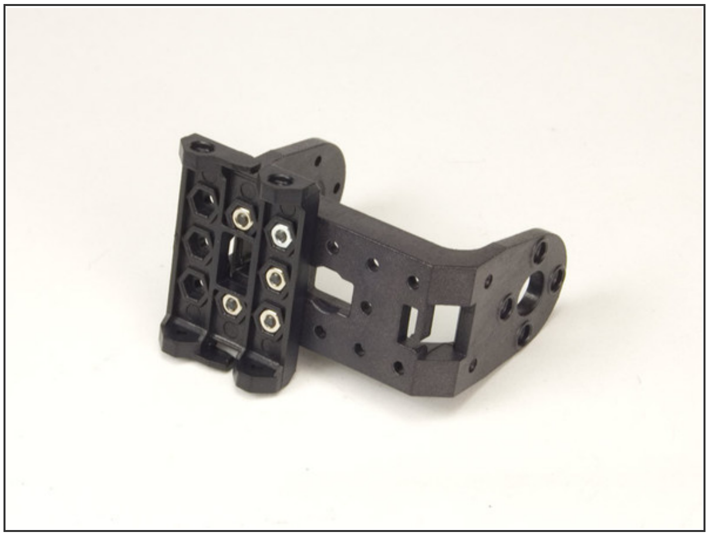
- Bolt the Fingertip spacers doen using M2x6 Hex Socket Head Bolts. The bolts go on the outside of the finger. They go through the finger and will self-tap into the ABS spacer.
  - 4x M2 x 6mm Socket Head Bolt

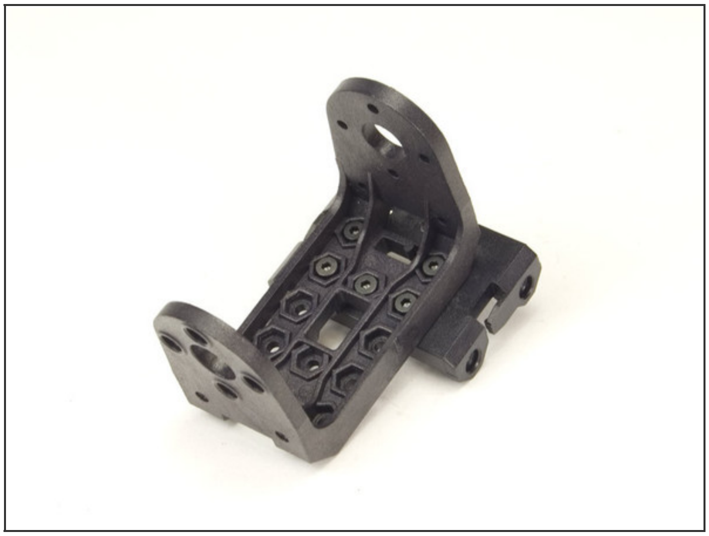
Step 9



- For the following steps you want to tap the M2 nuts into their seats. A few gentle-medium taps using a DIY punch will get the job done. This will secure the nuts nice and tight so it is easier to get the bolts threading.

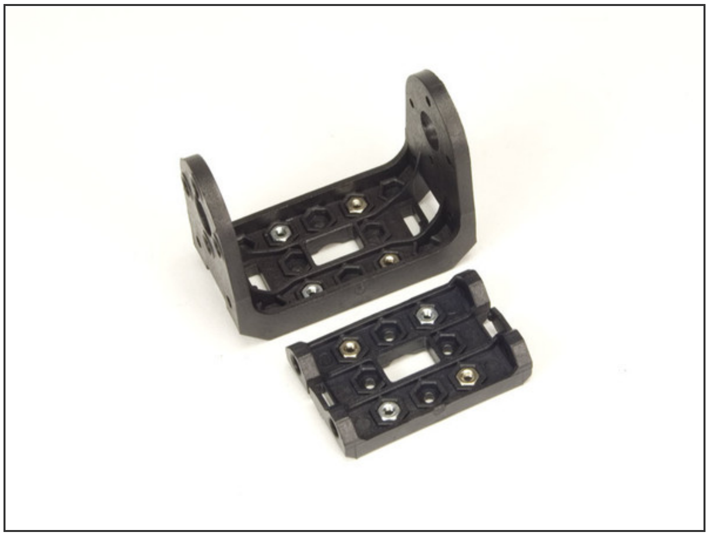
Step 10

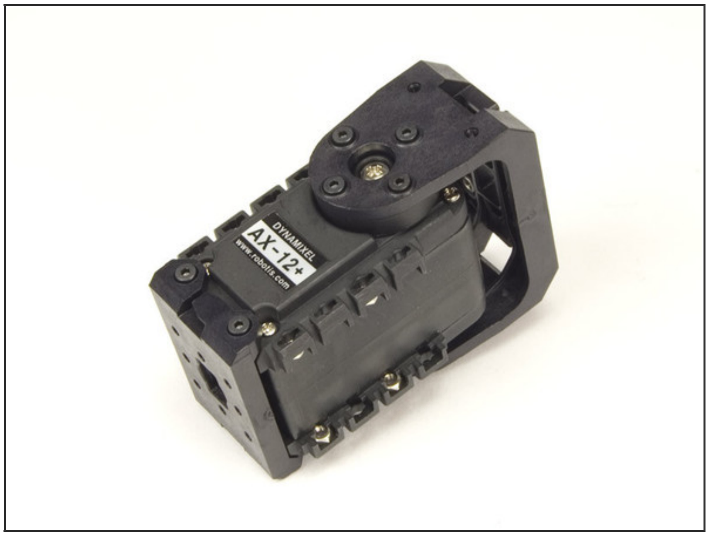




- First prep the F2 and F3 bracket as shown. It is easiest to put the nuts in the F3 bracket and run the bolt through the F2 bracket.
  - 5x M2 Steel Nut
  - 5x M2 x 6mm Socket Head Bolt
- Second picture shows Reverse View.

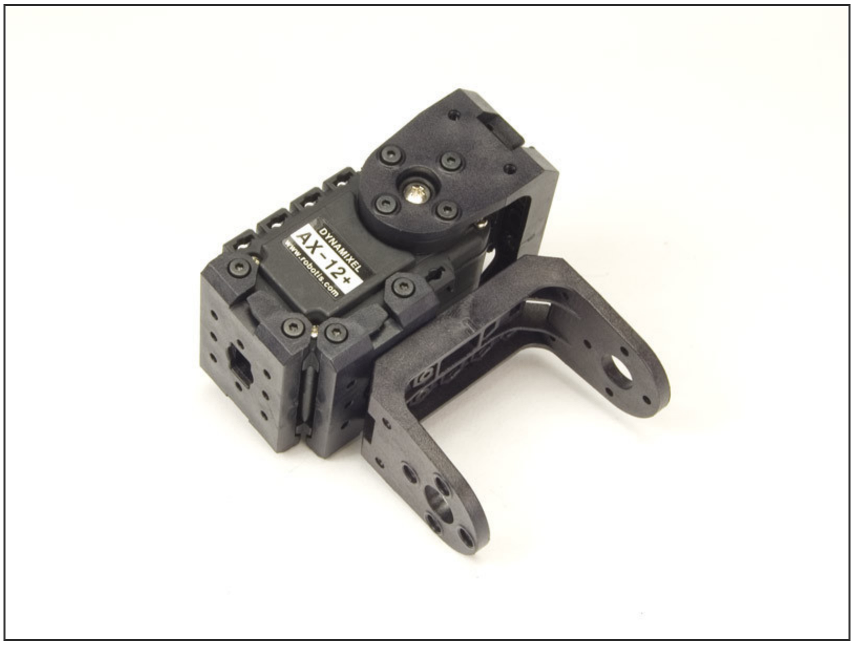
Step 11





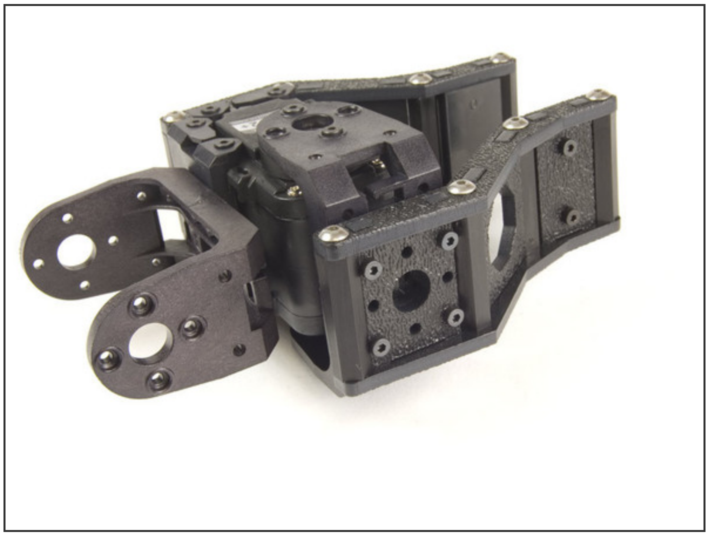
- With the remaining two F2 and F3 brackets tap in 8 M2 Nuts in the positions shown. This is in preperation for mounting the Gripper Fingers later.
  - 8x M2 Steel Nut
- Mount the F2 and F3 brackets on to your servo as shown.
  - 1x AX Hub Assembly
  - 8x M2 x 6mm Socket Head Bolt
  - 4x M2 Steel Nut

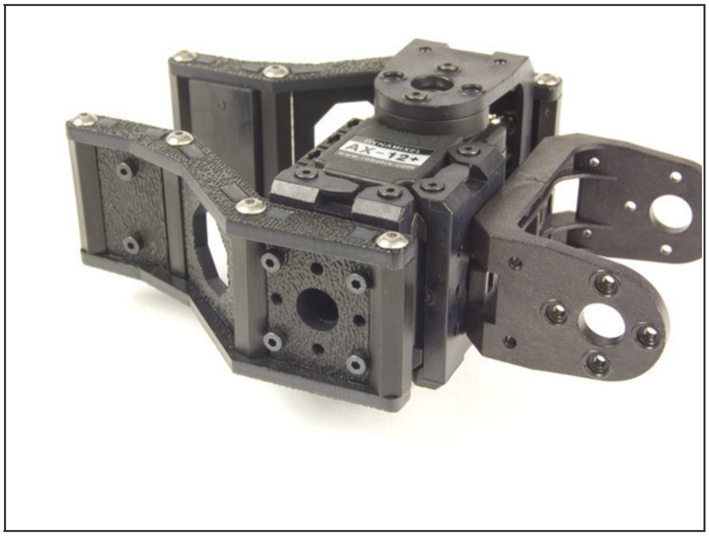
Step 12



- Now mount your bracket assembly as shown. Make sure to mount using the right bracket holes so that your gripper will be centered.
  - 4x M2 Steel Nut
  - 4x M2 x 6mm Socket Head Bolt

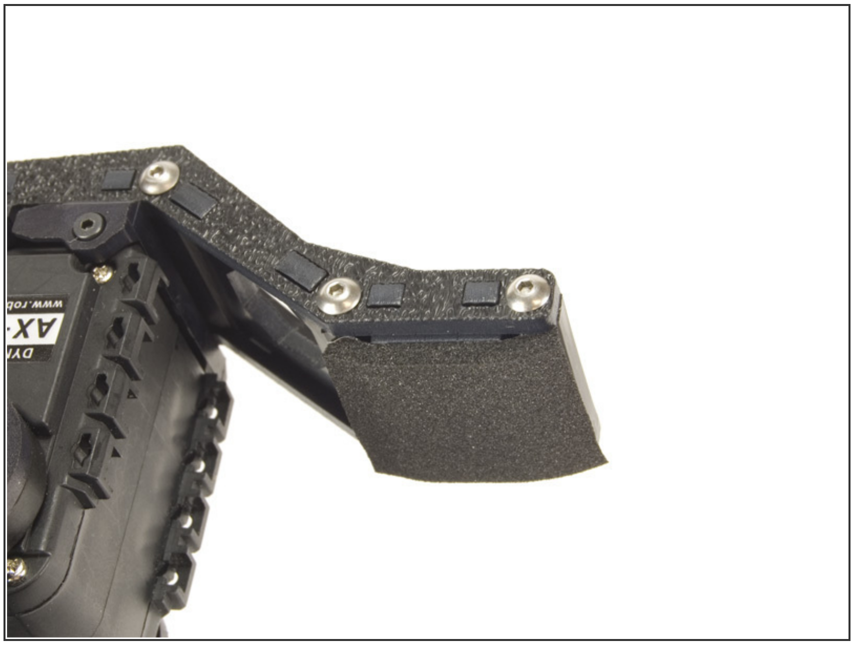
Step 13





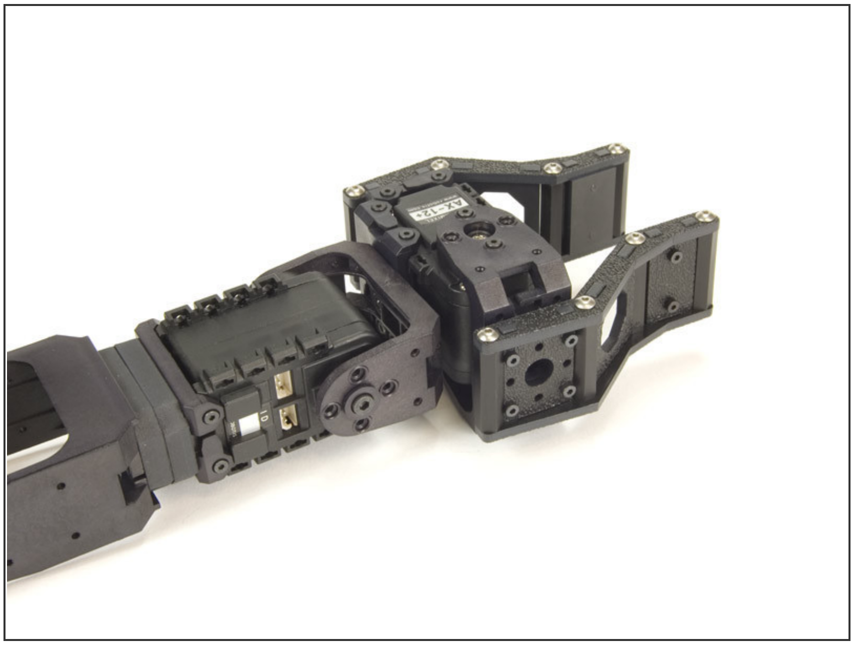
- Attach the Right Gripper Finger as shown with 4 M2x10 Hex Socket Head bolts.
  - 4x M2 x 10mm Socket Head Bolt
- Attach the Left Gripper Finger as shown with 4 M2x10 Hex Socket Head bolts.
  - 4x M2 x 10mm Socket Head Bolt

Step 14



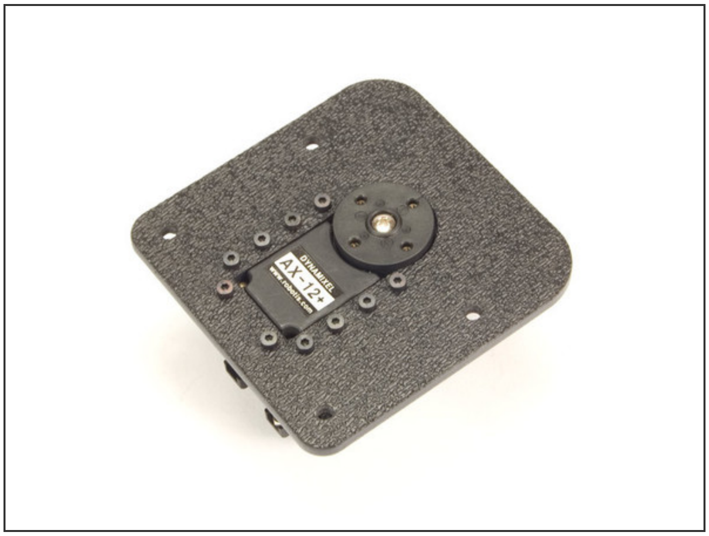
- The gripper comes with a strip of 1" X 1/8" foam. If your project requires a softer gripper finger, then cut the foam to size and apply as shown.
  - 1x Foam Strip (1" Wide x 1/8" Thick)

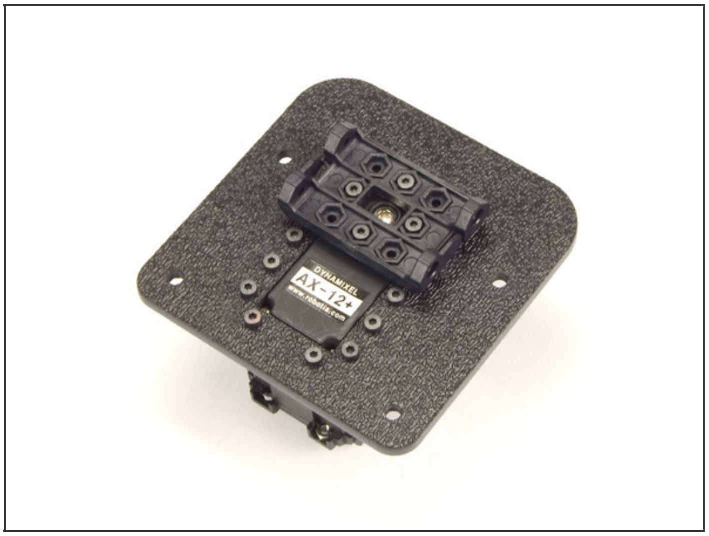
Step 15



- Attach the gripper as shown to the horn of the #4 servo. Be careful to pay attention and not put it on upside down.
  - 1x AX Hub Assembly
  - 4x M2 x 6mm Socket Head Bolt

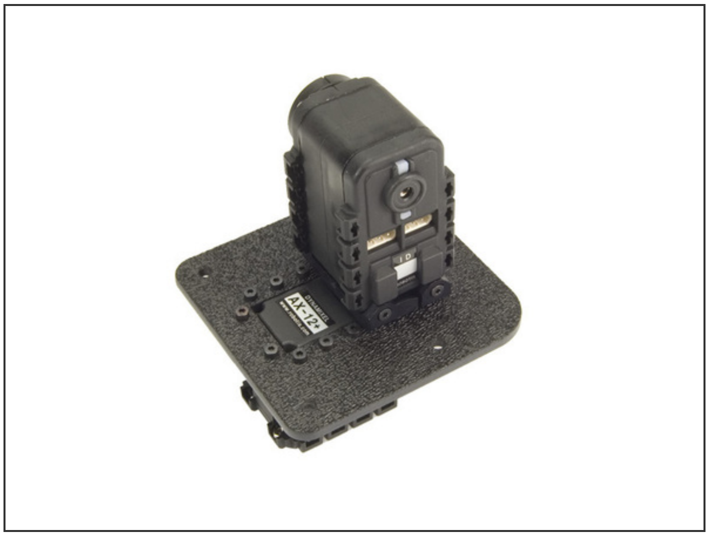
Step 16

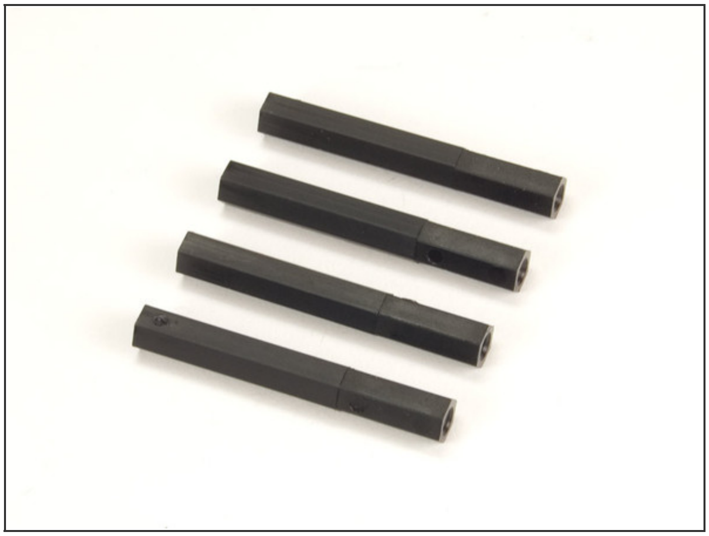




- Mount the #1 servo into the Base Plate.
  - 10x M2 Steel Nut
  - 10x M2 x 8mm Socket Head Bolt
- Mount an F3 Bracket to the servo horn.
  - 4x M2 x 6mm Socket Head Bolt

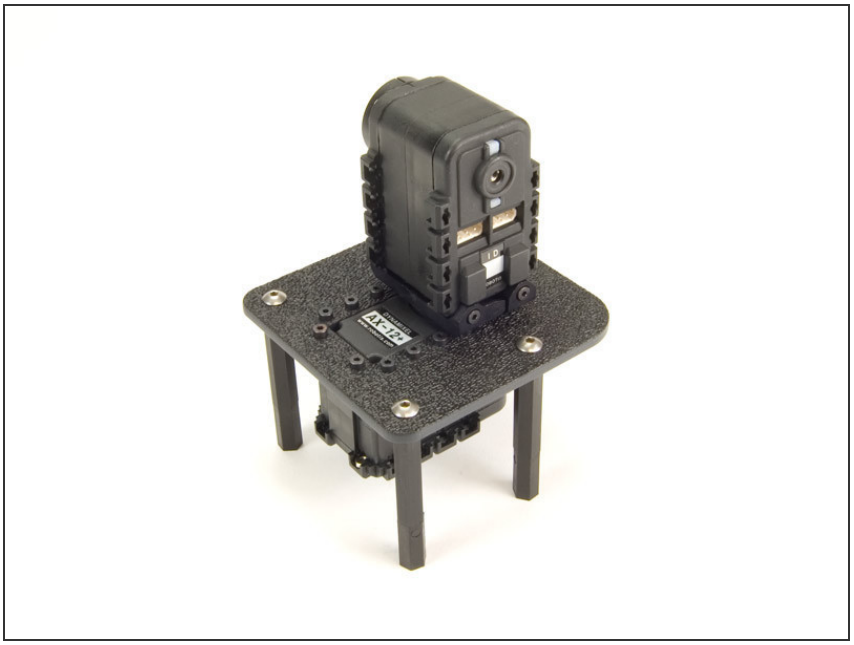
Step 17





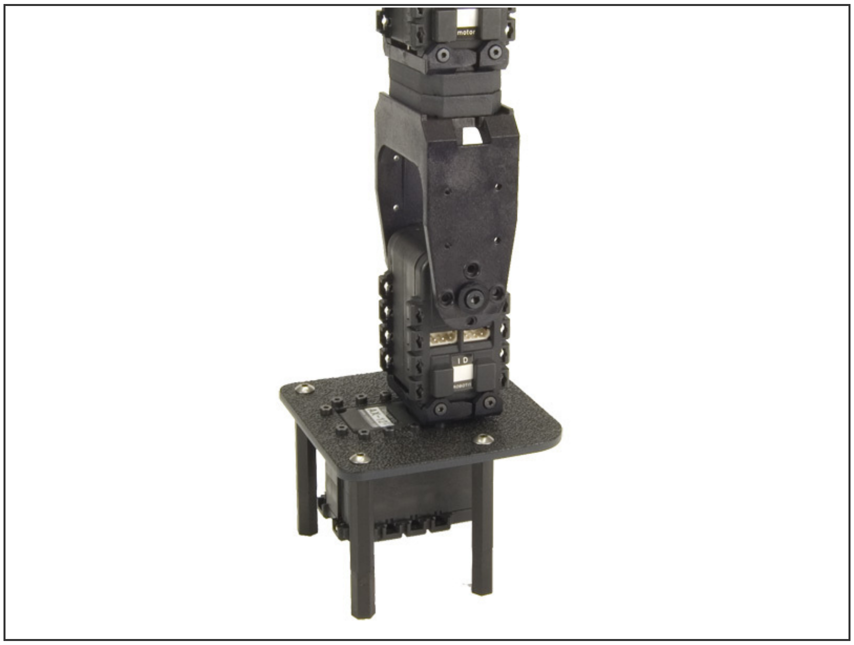
- Mount the #2 Servo as shown.
  - 4x M2 x 6mm Socket Head Bolt
  - 4x M2 Steel Nut
- Screw the M/F 6-32 3/4" standoff into the F/F 6-32 1.25" standoff. Tighten them snugly by rotating about a quarter turn past when the faces touch.
  - 4x F/F 6-32 x 1-1/4" Hex Standoff
  - 4x M/F 6-32 x 3/4" Hex Standoff

Step 18



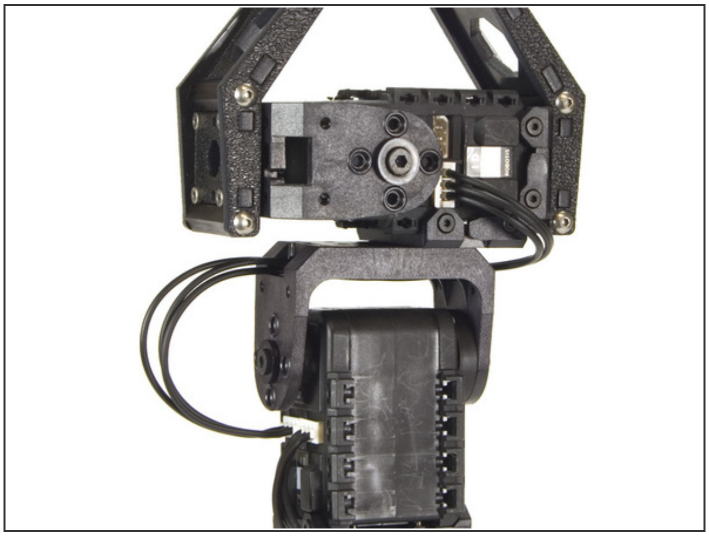
- Bolt the standoff assemblies onto the Base Plate.
  - 4x 6-32 x 3/8" Button Head Bolt

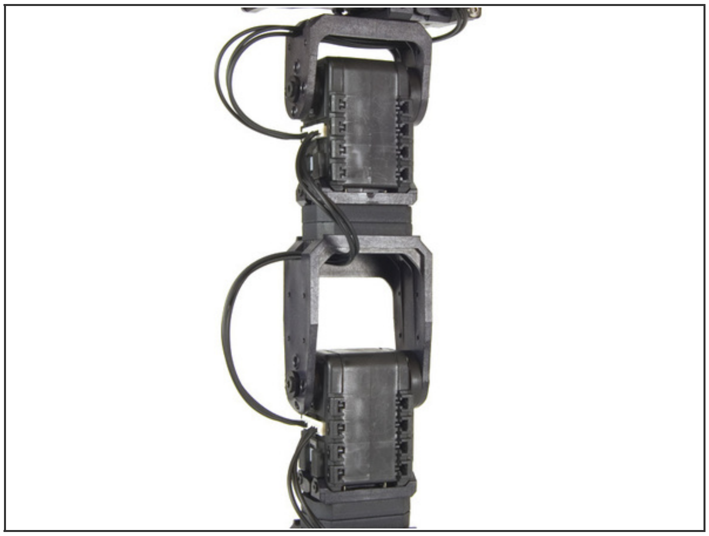
Step 19



- Mount the upper arm assembly to the base assembly.
  - 1x AX Hub Assembly
  - 4x M2 x 6mm Socket Head Bolt

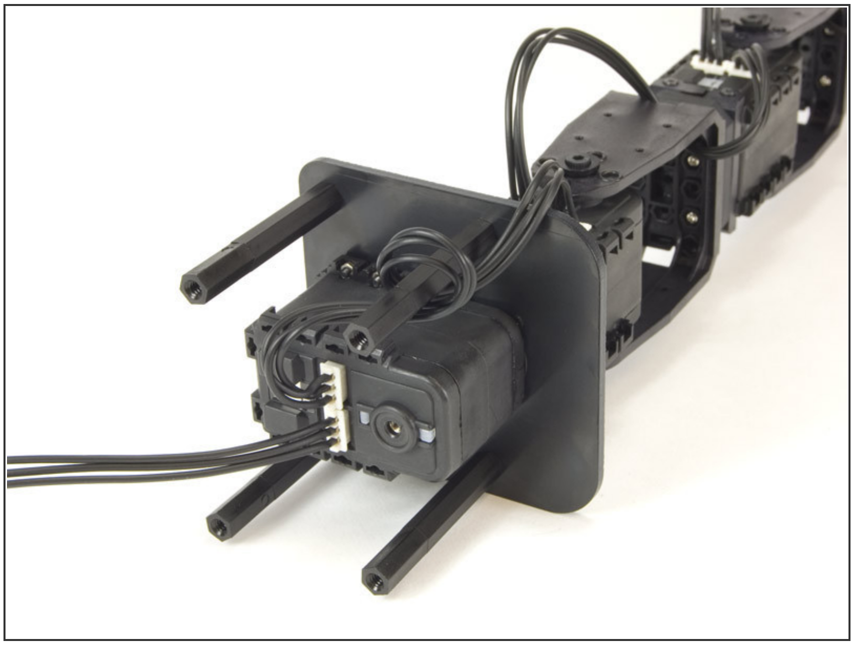
Step 20





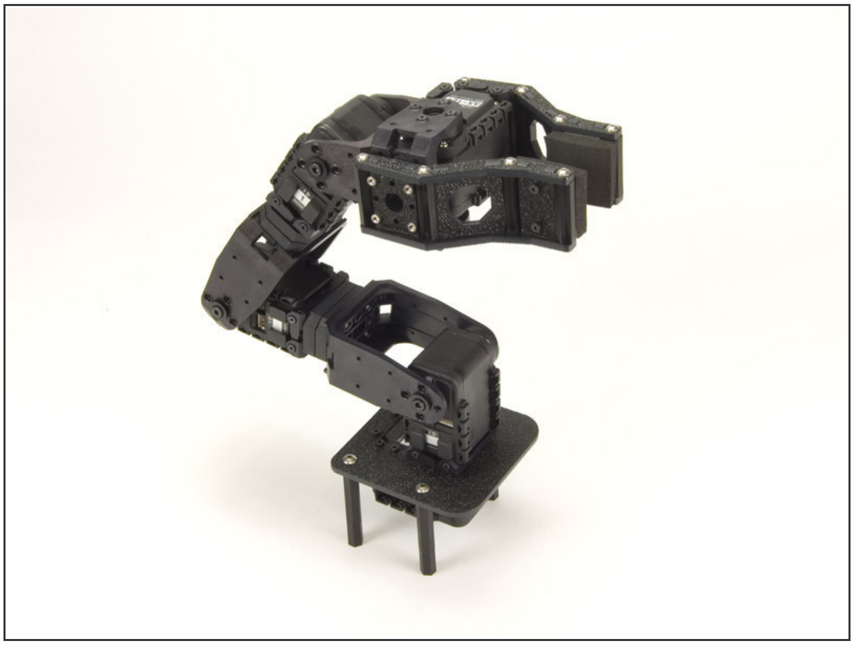
- Run the Gripper cable through the F2 bracket cable guide slots.
  - 1x 3-pin 200mm Dynamixel Cable
- Do the same on the next 2 cables/servos, but just use one slot on each bracket.
  - 2x 3-pin 200mm Dynamixel Cable

Step 21



- Wire up your Base Rotate Servo, and use another cable to go from this servo to the Arbotix, and you are all done.
    - 2x 3-pin 200mm Dynamixel Cable

Step 22



- FIN!
- Check out the next build guide for info on wiring up the arm to your arbotix, and powering the arbotix! Wiring and Attaching an Arm to Your TurtleBot

This document was last generated on 2012-10-31 11:31:13 PM.